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Castles every like a castle in effect.  
The scars or ravines the sole picturesqueness peculiar to limestone presents, for its regularity is too near evenness; you get long straight gulls, with tops as level as the coping of a wall, & steep, unbroken sides; & when, as in Buckden <sup>such</sup> Scar, above Kettlewell, you are shut in between both ~~but~~ gulls, it is as if you were imprisoned between colossal walls.

Hilsey Crag, by Conistone in Wharfedale, the Scar of Giggleswick near Settle, in Ribblesdale, & Malham Cove & Gordale Scar, within Airedale, are very fine examples of limestone scars; but of these it would be admitted that the great dislocation of the limestone, known as the Craven Fault, has had some share in their production. Gordale Scar & Malham Cove, indeed, present some of the finest rock scenery in England: the former has the appearance of enormous fossal fortresses, while Malham Cove presents a great section of a vast amphitheatre, 200 feet in height, with projecting corners which may represent teeth of gulls.

At the foot of the cliff is a low arch, the mouth of a cave, from this cave issues a clear stream, the infant Aire. But this is not the original course of the river, above the Cove, on the great limestone plateau of Malham, is Malham Tarn, & from this Tarn issues a stream, which flows down halving above ground, then, makes its escape through fissures in the rock, cuts out a way for itself through the boulders of the plateau, is increased by other underground streams, comes to light again, as we have seen, at the foot of Malham Cove.

Here we have an example of the history of a river-making: flowing water cuts through fissures of the rock, this partly by erosion, partly by dissolution of the rock substance enlarges.

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enlarge the cavities, until what was a mere crevice may become an enormous cavern. This is, shortly, the history of Clapham Cave, Hellin Caves, Headstone Caves, Victoria Caves, & others less well known, which rank among the "chests" of caves.

The stalactites & stalagmites which frequently adorn roof & floor of these limestone caverns are formed by a process simple enough. Water exposed to the air gives off some of the carbonic acid it contains; the less carbonic acid it contains, the less calcium carbonate (limestone) can it hold in solution. Therefore in a cavern where there is no circulation of air, less carbonic acid is given off, more limestone deposited by every drop which falls from roof to floor. A thin film of limestone remains attached to the roof, each smoother film is laid upon the floor by every falling drop; & in process of ages, these films lengthen, increase, take strange forms, become the well-known stalactites & stalagmites of the limestone caves.

We have spoken of the carboniferous remarkable vector of the valley of the limestone, this lowness is somewhat heightened by contact with the low brown moorland about upon moors. Thus, in upper Wharfedale, we have Great Whernside, Corriston Moor, & Gressington Moor on the east, at no great distance from the river the colouring changes quite suddenly, marking a sharp line of demarcation between verdure & barrenness. The high moor or gritstone grit, which bears little wet heather, coarse grasses, ling, crowberries & bilberry. The flora of the sandstone is poor, yet dull brown tint, with a purple glow when the heather is in bloom, distinguishes the grit-moor at a great distance.

A geological map shows many patches of grit resting upon the limestone - as Whernside, Ingleborough, Penyghent, Thornton Fell, which are all capped with grit, while they rest upon the limestone plateau. We have now to account for the presence of gritstones grit in the high places, soft limestone in the valleys. The fact is, that the whole country was thickly overlaid

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with millstone grit; this millstone grit, & the limestone below it to a great depth, have been removed by denudation worn away pretty by the rivers in the act of flowing, out their valleys.

But it is only in the Craven district that the millstone grit has been thus carried off, giving place to the rugged landscape of the limestone. In the rest of western Yorkshire, with this exception, we get the scenery proper to the grit; - bold escarpments rock masses, as at Otley Chevin, with low slaty or limestone moors, deep dales or glens, with wooded sides; the timber rather scanty, but various, oak copse being the most common; wet, peat-covered moors, <sup>the bottoms of glens,</sup> heaths, sometimes bogs, sometimes with huge boulders scattered over them, weather-worn, it may be, into extraordinary shapes, yielding little to the farmer, even in the lowland. You come upon miserable patches of green oats in November - such are the main features of the grit country, which is yet not without its attractions - fine air, & a delightful scene of speck on the uplands.

Occupying the south-west of the county, a geological map usually shows a dark patch, covering a district some 20 miles wide by 35 long, reaching from the extreme south to about five or six miles north of Leeds & Bradford, hemmed in on the east by the narrow Permian strip we have spoken of, on the west, by as narrow a strip of millstone grit. Here we have the series of beds known as the Coal Measures, - here, as a consequence, we have a densely populated district, containing all the great manufacturing towns of Yorkshire.

Here the limestone is gone & the landscape tapers more where the grit is the surface rock. Brick is rarely used as a building material, public buildings & private dwellings being commonly constructed of the good building stone which the country affords - a fact which gives an air of dignity & prosperity to the manufacturing towns of the West Riding. The bare hills are scarred with many quarries, the signs of coal pits or iron

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iron works disfigures the landscape: the streams run black, black as ink, besprinkled with cinders of the dyework & other refuse: the atmosphere is dull, laden with the smoke of many mills and many furnaces: the foliage is green, only in the early days of a wet spring. When the coal-field is scored by river-valleys, the unlovely scenes attending manufacturing industries have not quite spoiled the beauty of the country: & even had they done so, this section of the West Riding must needs pay a price for being on the shore or of the greatest & most thriving seats of industry in the empire.

This great coal-field reaches down into Nottingham, but our concern is with that part of it which lies within Yorkshire, - a strip of the 'Lower Coal Measures' upon which stand Leeds, Bradford, Halifax, Huddersfield, bordering the central mass of the 'Middle Coal Measures', wherein are Wakefield, Barnsley, Rufford, Rotherham.

Perhaps the best-known coal of the Lower Coal Measures in Yorkshire is, the Better Bed Coal of Bradford, a bright-coal, very free from sulphur, used in working the Low Moor ironstone.

The latter exists in layers, crevices more than two feet in thickness, far above the coal seams: perhaps the Low Moor iron owes its celebrity for superior toughness as much to the excellence of the Better Bed coal as employed in smelting as to the qualities of the ironstone. The Beeaton Coal Bed, near Leeds, is another valuable bed, six feet thick in some places.

Of the Middle Coal Measures, so-called as being less deeply buried than the lower measures, perhaps the most valuable seam is the Lithestone Coal, resting from the southern boundary of the County to Barnsley above Barnsley. This is excellent household coal much of which is sent to London. The Middle Coal Measures are so called, by the way, denoting less deeply buried

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having considered the geological formation & the landscape  
of the West Riding, we can only glance briefly at those  
of the remainder of the country.

The Permian Strip is as we have said, a long  
low terrace from two to five miles in width, stretching  
from the southern boundary of the county to a  
few miles north of Ripon. ~~Scars of~~ <sup>10</sup> ~~greenish~~ <sup>10</sup> limestone mark its junction with the Millstone  
grit country on the east of it. It sustains  
no great seats of industry, Knaresborough, Thirsk,  
Ladcaster, Pickering, are among its towns.  
When it is cut by the river valleys, as at Thorpe Beck,  
it is picturesque & lovely, everywhere. It is  
well wooded & fertile, being covered with a rich  
soil which appears to promote the growth of  
apples. The traveller who has come off the  
barren millstone grit is surprised to find  
himself, say between Knaresborough & Ripon, in  
a region of apple orchards & cornfields, but  
reminds him of Hereford.

The Vale of York should give us the scenery proper  
to the Keuper formation; but practically it  
is an alluvial valley, overlain with recent  
deposits laid down by the rivers, a fertile  
scutcheon as all such valleys are.  
Russoe Yorkshire, to the north of the Derwent  
valley, is another picturesque region  
with wild woodlands, lovely glens, with  
waterfalls. The woodlands & hills are  
capped by the sandstone rocks of the Solite  
series, which form, in fact, a table-land  
cut through by the streams which fall  
into the Tees on the one hand or the Derwent  
on the other, for here we have a distinct river  
system, the watershed of the Solite extension

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A third industry supported by the sea is the jet-manufacture of Whitby. The jet-rock is a band of the sea some twenty feet thick, hard, dark-colored & bituminous. Here the jet lies in beds, is got at by making holes in the face of the cliff N. of the level sea-jet should be found. A rather dangerous occupation. The jet-manufacture is more curious interesting than commercially important: it employs between one & two thousand persons. Jet is like coal, a vegetable product, possibly derived from the ~~resin~~ <sup>shells</sup> of bituminous droppings of ancient fish. With the cement stones found in the alum shall furnish the fourth industry of this district. They are prepared for manufacturing purposes by being calcined ~~and~~ <sup>and</sup> powdered.

The ammonites are the characteristic fossils of the sea; they are found in great number & many varieties. ~~They are scattered~~ <sup>and</sup> ~~are scattered~~ <sup>in</sup> patches of sand or shales or limestones. Whitby & Scarborough have exceedingly interesting geological museums, exhibiting the fossils of the sea.

No part of England ~~presents~~ <sup>has</sup> a finer coast than this of Yorkshire, here from Filey Bay northwards where the cliffs present bold perpendicular faces to the sea. The sea is capped by the harder shale which resists the weathering that would have worn away the softer strata. Kettle Ness, 370 feet; Rock Cliff, 660, the Reak, 600. First step cliff, Stea by, the Reak Cliff, the Castle Head of Scarborough, with cliff on which Whitby Abbey stands are all remarkable specimens.

In the opposite Vale of Pickering, the valley of the Derwent,  
which separates the eastern moors from the chalk woods  
possesses characters of the glacial drift brought down  
her at a period when northern England lay under  
ice and then in short as within day cover much  
of Greenland. Alluvial deposits have been  
spread upon the glacial clay to a great depth, gradually  
rising levelling the valley, making it one of the  
most-fertile districts of Yorkshire. To the south of the  
valley we have the long line of the chalk hills stretching  
inland from Scarborough Head, weather worn into  
soft curves, across chalk hills everywhere up.  
To the north, the moors end, here and there, in such  
steep cliffs as we have already seen facing the  
sea: ~~but the noble capes of York & Hull.~~ & indeed  
it seems pretty certain that the val was at  
one time a bay. Rich in glacial times, becomes  
soakled with drift - that the sea <sup>still</sup> kept out.  
After the retreat of the ice comes northward regions.

To the south of the Vale of Pickering we  
find the chalk, which covers, to a depth of 600  
feet, a district measuring nearly 600  
square miles. Its outer boundary reaches  
in the form of a crescent, from Scarborough  
Head on the north, a little to the west of Hull.  
Here, as on the Downs of the south, we have a <sup>almost</sup> undulating country, ~~desolate~~ <sup>deserted</sup> of numerous  
water, the valleys & the hill-slopes supporting  
heavy corn crops more commonly than the  
few clover ~~and~~ <sup>and</sup> grasses on the chalk. Sometimes  
the chalk rises into bold heights, as at Wilton-  
Beacon, 400 feet above the sea, & Hornby Beacon,  
500 feet high. While the tree capped South Down

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The Wolds are almost desolate places. The few miles of chalk west are greatly worn by the action of the waves into creeks & reefs. The few streams of the Wolds are fed by intermittent springs, like the levaunts of the Scotts Down: here, these are called fayreys (herds). Thirst-scarbath italy as the minerals paper to the chalk.

Holderness, which lies without the chalk crescent we have spoken of, has an interesting geological history.

It is covered with boulder clay, hard & dark, & full of angular fragments of rocks which are found in situ in Norway, Scotland, & northern England. Geologists are agreed that this boulder clay witnesses to the fact that northern England was, at three different periods, as completely under an ice-covering as is Greenland at the present time. But - the boulder clay is pretty overlaid by alluvial deposits - peat, sand, &c; & these are due, not to the flooding of rivers, but to the silting up of the prairie which originally bordered the coast: of these, Hornsea Mere is the only one still in existence as a shallow lake. Though it is low, Holderness is not-level, except in the south, where there is much marsh land reclaimed from the Humber. The structural history of this district is not confined to the past: from Bridlington to Spurn Head, the land is retreating before the sea at the rate of two yards a year; that is, a strip, soon six feet wide is annually carried off from the coast. Towns, villages, churches, parsonyards, have been carried away bit by bit, & ravaged by the port-holes. Henry of Bolingbroke landed to claim the crown, has been lost bodily, leaving nothing more than a summertime when it stood somewhere near Spurn Point. Spurn Point itself, with the ridge which connects it with the mainland, is but a sandbank; but, nothing to the Point, new lands are being laid down, formed of the material which the sea has stripped from the coast, together with the mud brought down by the Humber. The wild mud flats thus laid down are of great interest as showing slate bands in the very process of making.

## The Mountains of Yorkshire.

The mountainous mass north of Ribblesdale has thirty summits above 2,000 feet in height. Of these, Middle Fell, 2,580 ft., is the highest in the country; it is not exactly a plateau hill, as a low summit runs the boundary line between Wharfedale & Mallerstang. South south of Middle Fell the land sinks into Swannmore, a broad flat moor with rugged heights and, beyond Swannmore is the great mountain - plateau of western Yorkshire rising in many ridges or fell's, over the Wensleydale, Swaledale, Nidderdale, Wharfedale all have their sources.

Still going southwards is the triangle formed by Arthingholme & Swaledale - a belt traversed by many miles of rich lead veins, running east-west, such as the famous Ashdale & Arthingholme lead mines - or the moorland falls exceeding 2,000 feet, Boggan Head, Waterhead, & Pin Head.

Following the Swale up to its head, we come to a very heavy region - a semi-circle of moorland fell's, including Rievaulxdale, High Fell, Baby's Riddle &c., forming the eastern side of the glacial pass of Maltonshire, which has bold banks in Westmorland in the west.

Between Swaledale & Mallerstang is Buttertubs - belonging to the latter, near the former, lies Rievaulx with lonely seat - & Swannmore Fell on either hand, with numerous strong red falls in limestone, but offering glorious views of the mountains around over the south Nidderdale, commanding Langdale & Wharfedale, a noble amphitheatre isolated well

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with a floriess view of Monks Dale, or the least  
of the summits of the North Riding in two species  
~~noted~~.  
Of the more pulmonary mountain region of the South  
Riding it is necessary to speak more in detail.  
Pen-y-Gill Heads, in the extreme west corner of the county,  
partly in Westmoreland & cut off from the rest  
of Yorkshire by the lonely Swale valley, belongs to  
the ~~salt~~ hills of the Lake Country, & presents the  
billowy broken aspect of the Cambrian mountains.  
Rather than to consider a straggling outline of  
the limestone & gritstone pells.

The ~~connection~~  
still within the ~~southern~~ <sup>Pictureque</sup> ~~valley~~ strip of the country  
whose drainage falls into the Irk & Lee, we have  
the long straight gills which start in Garsdale &  
Hartdale, with the valleys of fellsides of the Penn.  
Dentdale, one of the beauties of Yorkshire, is a mere  
ravine ~~is~~ <sup>between</sup> between transverse ridges  
running east & west. For travellers by the Great  
Midland line between Settle & Carlisle comes  
the mouth of the valley: a break occurs in the  
wild landscape of moor & mountain & the gap  
discloses itself. A long valley, more than a mile  
long, soft sunning them the base of the mtn.  
The salt-wie station is well built